

# Service Manual

Tuner

QUARTZ Synthesizer FM/AM Stereo Tuner

ST-X70

Color

(K)... Black Type



| Color | Area                   |
|-------|------------------------|
| (K)   | [EGB]... F.R. Germany. |

## TECHNISCHE DATEN

(DIN 45 500)

### ■ UKW-TUNERTEIL

|                                                 |                                     |
|-------------------------------------------------|-------------------------------------|
| Wellenbereich                                   | 87,50 ~ 108,00 MHz                  |
|                                                 | 87,525 ~ 108,00 MHz (+25 kHz shift) |
| Eingangsempfindlichkeit                         |                                     |
| S/R 30 dB                                       | 1,3 $\mu$ V (75 $\Omega$ )          |
| S/R 26 dB                                       | 1,2 $\mu$ V (75 $\Omega$ )          |
| S/R 20 dB                                       | 0,9 $\mu$ V (75 $\Omega$ )          |
| Nutzempfindlichkeit nach IHF                    | 1,5 $\mu$ V (nach IHF '58)          |
| Stereoumschaltsschwelle bei 46 dB nach IHF      | 28 $\mu$ V (75 $\Omega$ )           |
| Gesamtklirrfaktor                               |                                     |
| Mono                                            | 0,15%                               |
| Stereo                                          | 0,3%                                |
| Geräuschabstand                                 |                                     |
| Mono                                            | 70 dB (77 dB nach IHF)              |
| Stereo                                          | 64 dB (70 dB nach IHF)              |
| Frequenzgang                                    | 20 Hz ~ 15 kHz (+0,5 dB ~ -1,5 dB)  |
| Trennschärfe bei Störsender                     | 70 dB                               |
| Einfangverhältnis                               | 1,0 dB                              |
| Spiegelfrequenz-Dämpfung bei 98 MHz             | 90 dB                               |
| ZF-Dämpfung bei 98 MHz                          | 100 dB                              |
| Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz | 100 dB                              |
| MW-Unterdrückung                                | 55 dB                               |
| Übersprechdämpfung                              |                                     |
| 1 kHz                                           | 40 dB                               |
| Trägerrest                                      |                                     |
| 19 kHz                                          | -60 dB (-60 dB nach IHF)            |
| 38 kHz                                          | -60 dB (-60 dB nach IHF)            |

|                                    |                             |
|------------------------------------|-----------------------------|
| Kanalabweichung (250 Hz ~ 6300 Hz) | $\pm 1,0$ dB                |
| Begrenzereinsatz                   | 1,2 $\mu$ V                 |
| Bandbreite                         |                             |
| ZF-Verstärker                      | 180 kHz                     |
| UKW-Demodulator                    | 1000 kHz                    |
| Antennenanschluß                   | 75 $\Omega$ (unsymmetrisch) |

### ■ MW-TUNERTEIL

|                                      |                           |
|--------------------------------------|---------------------------|
| Wellenbereiche                       | 522 ~ 1629 kHz            |
| Eingangsempfindlichkeit (S/R 20 dB)  | 20 $\mu$ V, 300 $\mu$ V/m |
| Trennschärfe ( $\pm 9$ kHz)          | 55 dB                     |
| Spiegelfrequenz-Dämpfung bei 999 kHz | 40 dB                     |
| ZF-Dämpfung bei 999 kHz              | 60 dB                     |

### ■ ALLGEMEINE DATEN

|                     |                                |
|---------------------|--------------------------------|
| Ausgangsspannung    | 0,5 V (0,9 V, IHF)             |
| Leistungsaufnahme   | 8W                             |
| Netzspannung        | Wechselstrom 50 Hz/60 Hz, 220V |
| Abmessungen (B×H×T) | 315 × 60,5 × 250 mm            |
| Gewicht             | 1,7 kg                         |

#### Bemerkung:

Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.

(Die technischen Daten können infolge von Verbesserungen ohne Ankündigung geändert werden.)

# Technics

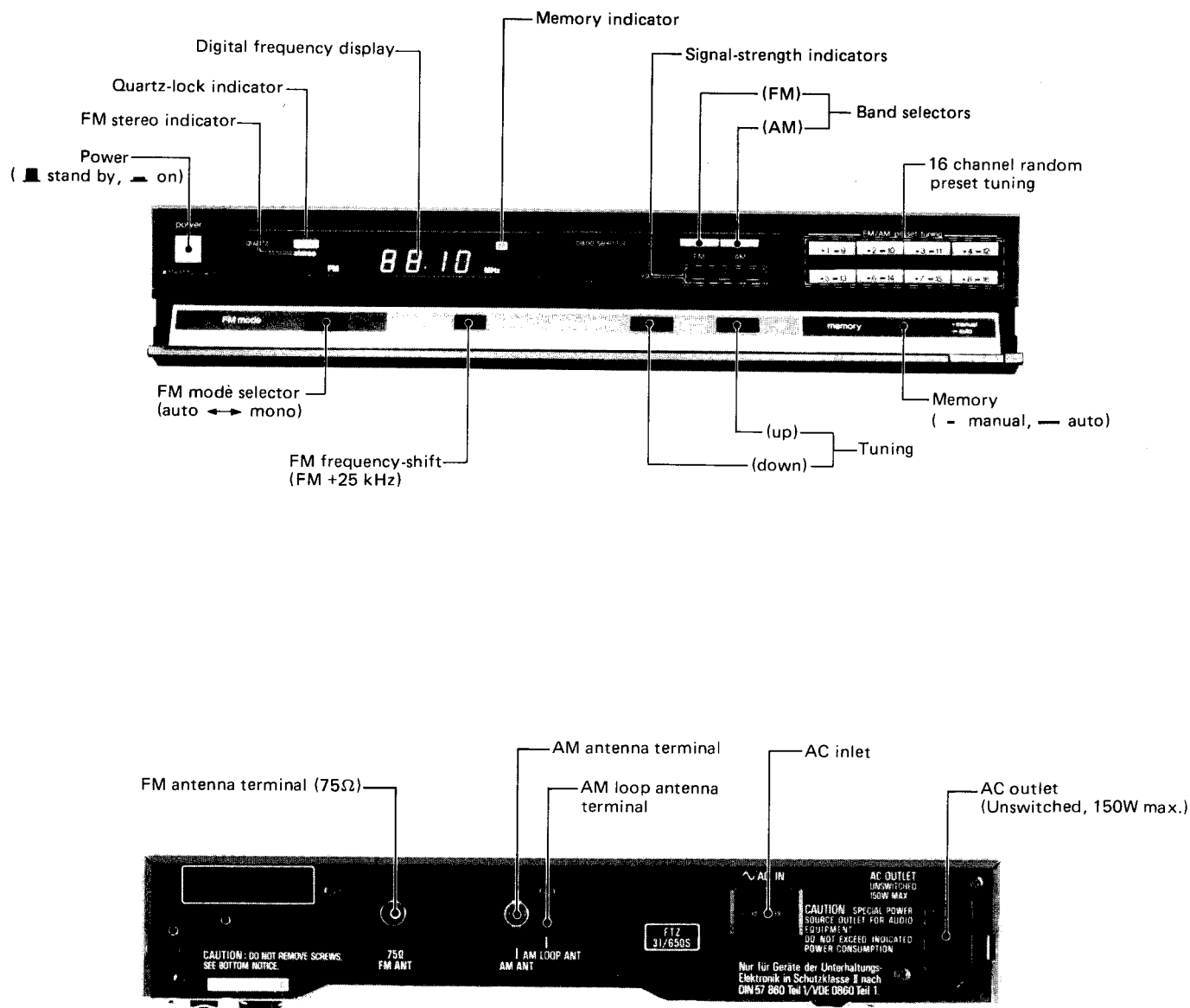
Matsushita Electric Trading Co., Ltd.  
P.O. Box 288, Central Osaka Japan

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## LOCATION OF CONTROLS



VORABSTIMMUNG DER EMPFANGSFREQUENZEN

Es können bis zu 16 UKW- und MW-Empfangsfrequenzen vorabgestimmt werden. Nachdem die Frequenzen auf unten beschriebene Weise voreingestellt wurden, brauchen Sie nur die betreffende Taste zu drücken, um den gewünschten Sender abzustimmen.

Vorabstimmung

Sie können je nach Wunsch die Vorabstimmung entweder automatisch oder manuell vornehmen.

Vor der Vorabstimmung

Auf jeder Taste können zwei Sender vorabgestimmt werden. Vorabstimmung der vorderen Kanäle (1—8) Vorabstimmung der hinteren Kanäle (9—16)



Kurz antippen.



Etwas länger drücken.

Automatische Vorabstimmung

Beginnend mit der tiefsten Empfangsfrequenz werden von der angezeigten Frequenz weg die UKW- bzw. MW-Sender automatisch in die „Kanäle“ 1 bis 8, bzw. 9 bis 16 abgespeichert. Beachten Sie, daß in gebirgigen oder sehr entlegenen Orten Sender mit schwachen Empfangssignalen nicht automatisch vorabgestimmt werden können.



Drücken bis sich die Frequenzanzeige ändert.



(Die Frequenz läuft nach oben und die automatische Vorabstimmung beginnt mit dem Sender mit der niedrigsten Frequenz.)

Tragen Sie die Namen (Rufzeichen usw.) der vorabgestimmten Sender und die „Kanalnummer“ in die Tabelle ein.

Überprüfen der vorderen Kanäle (1—8):

Kurz antippen.

Die Kanalnummer wird angezeigt.

Die gespeicherte Frequenz wird angezeigt.



Überprüfen der hinteren Kanäle (9—16):

Etwas länger drücken.

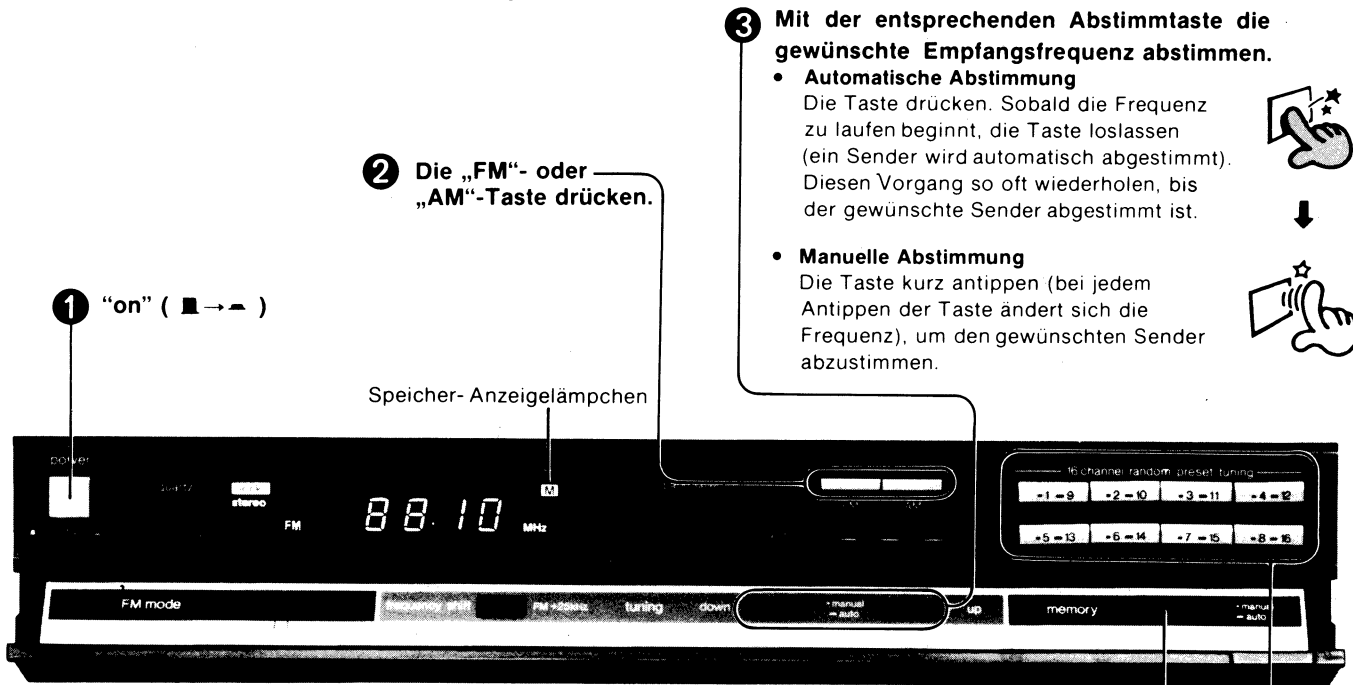
Sobald die Kanalnummer angezeigt wird, die Taste loslassen.

Die gespeicherte Frequenz wird angezeigt.



Manuelle Vorabstimmung

Die Sender können in jeden beliebigen „Kanal“ abgespeichert werden.



Kurz antippen

(Das Speicher-Anzeigelämpchen leuchtet für ungefähr 4 Sekunden.)



Bemerkung:

Falls die Taste länger gedrückt wird, ändert sich die Frequenz und die automatische Vorabstimmung beginnt. Die automatische Vorabstimmung kann durch nochmaliges Drücken der Tasten „up“ oder „down“ unterbrochen werden.

Während das Speicher-Anzeigelämpchen leuchtet, die für diese Frequenz bestimmte Vorabstimm Taste drücken.

Vorabstimmen der „Kanäle“ 1 bis 8:



Die Taste nur kurz antippen.

Vorabstimmen der „Kanäle“ 9 bis 16:



Die Taste etwas länger drücken.

Sobald die Taste gedrückt wird, erlischt das Speicher-Anzeigelämpchen, und die Vorabstimmung ist beendet.

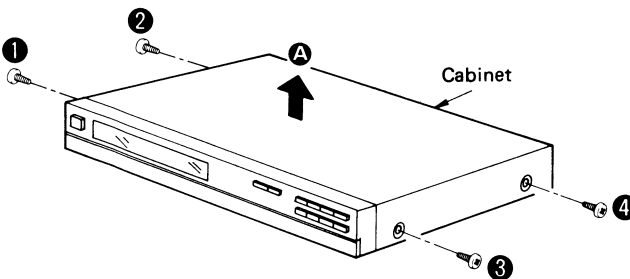
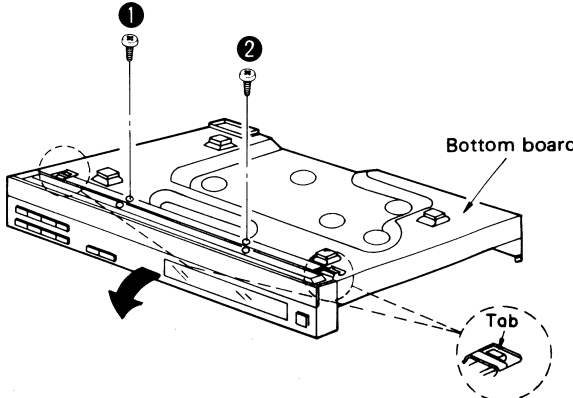
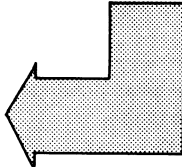
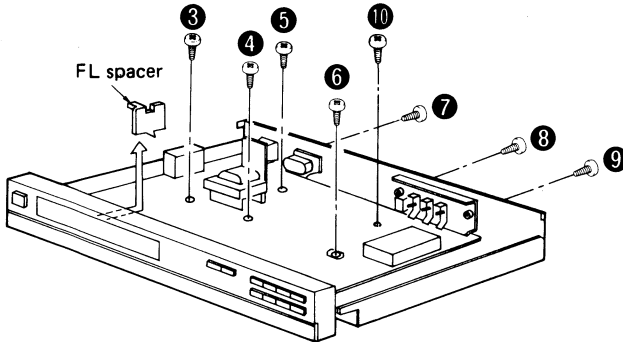
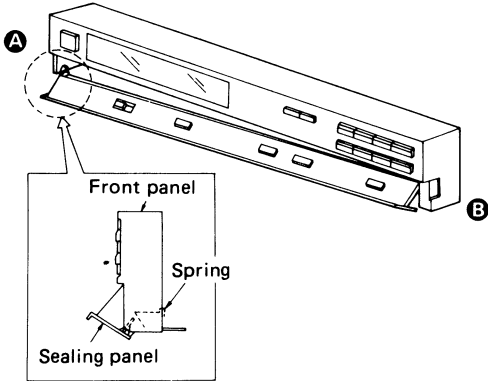
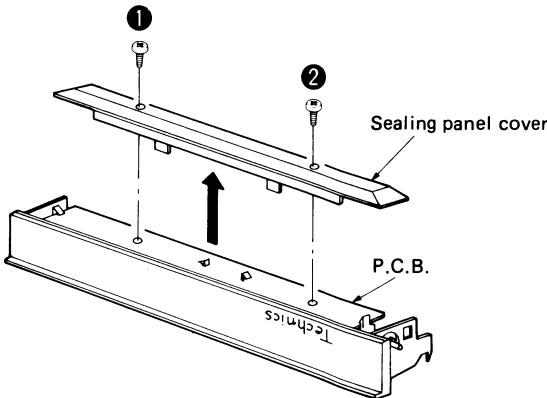
Bemerkung:

- Falls das Speicher-Anzeigelämpchen erlischt, bevor Sie die Taste drücken, müssen Sie die Schritte (4) und (5) wiederholen.
- Wenn neue Sender gespeichert werden, wird der auf diesem „Kanal“ schon abgespeicherte Sender gelöscht.

Tragen Sie die Namen (Rufzeichen usw.) der vorabgestimmten Sender in eine Tabelle ein.

Damit ist die Vorabstimmung der Empfangsfrequenz abgeschlossen. Die anderen Vorabstimm-tasten können auf die gleiche Weise (Schritte [2] bis [5]) voreingestellt werden.

## DISASSEMBLY INSTRUCTIONS

|                                                                                                                 |                                                                                                                                             |                                                                                                                                                                                                  |                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Ref. No. 1                                                                                                      | <b>How to remove the cabinet</b>                                                                                                            | Ref. No. 2                                                                                                                                                                                       | <b>How to remove the main P.C.B.</b>                                                                                                        |
| <b>Procedure 1</b>                                                                                              | <ul style="list-style-type: none"> <li>Remove the 4 screw ( ❶ ~ ❷ ).</li> <li>Move the cabinet in the direction of the arrow ❸ .</li> </ul> | <b>Procedure 1 → 2</b>                                                                                                                                                                           | <ul style="list-style-type: none"> <li>Remove the 2 screws ( ❶ , ❷ ).</li> <li>Push the 2 tabs.</li> <li>Remove the front panel.</li> </ul> |
|                                |                                                                                                                                             |                                                                                                                |                                                                                                                                             |
| <ul style="list-style-type: none"> <li>Remove the FL spacer.</li> <li>Remove the 8 screws ( ❸ ~ ❿ ).</li> </ul> |                                                                                                                                             |                                                                                                              |                                                                                                                                             |
|                               |                                                                                                                                             |                                                                                                                                                                                                  |                                                                                                                                             |
| Ref. No. 3                                                                                                      | <b>How to remove the sealing panel</b>                                                                                                      |                                                                                                                                                                                                  |                                                                                                                                             |
| <b>Procedure 1 → 3</b>                                                                                          | <ul style="list-style-type: none"> <li>Open the sealing panel and press it down at side ❶ .</li> </ul>                                      | <ul style="list-style-type: none"> <li>Remove the 2 screws ( ❶ , ❷ ) to remove the P.C.B.</li> </ul>                                                                                             |                                                                                                                                             |
|                              |                                                                                                                                             |                                                                                                              |                                                                                                                                             |
|                                                                                                                 |                                                                                                                                             | <p><b>Note:</b> When fitting the sealing panel, remove the sealing panel cover, and first set the ❷ side and make sure the spring is in contact with the sealing panel, then set the ❶ side.</p> |                                                                                                                                             |

## MESSUNGEN UND JUSTIERUNGEN

### MW/UKW

#### Einstellungen der Bedienelemente und zu verwendende Geräte.

- MW/UKW-Meßsender (MW/UKW-MS)
- Stereo-Modulator
- Verzerrungs-Analysator
- Oszilloskop
- Elektronische Wechselstrom- und Gleichstrom-Voltmeter (EVM).
- Frequenzzähler
- Drosselspule (100µH)
- Widerstand (100kΩ)
- Keramischer Kondensator (200pF)

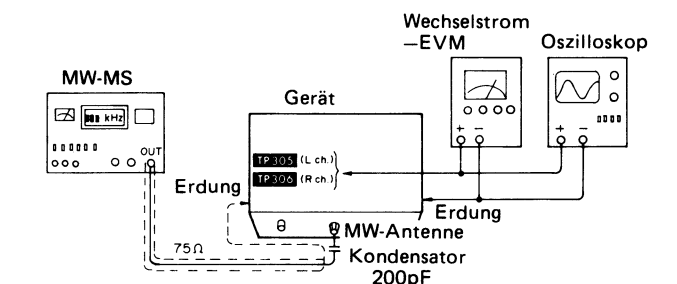
**Anmerkung:** Für T201 (MW-ZFT), L203 (MW-OSZ.-Spule) und L301, L302 (19 kHz, 38 kHz Tiefpaßfilter) werden justierte Ersatzteile geliefert. Die Kerne dieser Teile daher nicht drehen.

#### MW-HF-JUSTIERUNG

- Der Testaufbau ist in der Abbildung gezeigt.
- Das Gerät auf "AM" einstellen.
- Die Radiofrequenzanzeige und den Meßsender auf 612 kHz einstellen.
- L202 auf maximale Ausgangsleistung abgleichen.
- Die Radiofrequenzanzeige und den Meßsender auf 1503 kHz einstellen.
- CT201 auf maximale Ausgangsleistung abgleichen.
- Die Schritte 3—6. wiederholen.

**Anmerkung:** Der Antenneneingang-Signalpegel muß so niedrig wie möglich und frei von automatischer Verstärkungsregelung (AGC) sein.

**ZUSTAND DES MW-MESSENDERS**  
Modulation ..... 30%  
Modulationsfrequenz ... 400 Hz

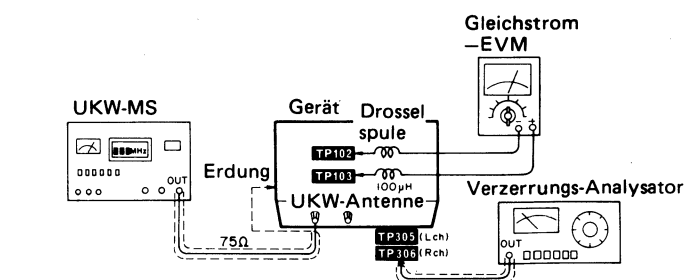


#### UKW-MONO-VERZERRUNGS-JUSTIERUNG

- Der Testaufbau ist in der Abbildung gezeigt.
- Das Gerät auf "FM" einstellen.
- Die Radiofrequenzanzeige und den Meßsender auf 100.10 MHz einstellen.
- Den Kern von T101 so justieren, daß die im Signalzustand gemessene Spannung 0 mV (0 ± 50 mV) im 300 mV-Bereich beträgt.
- T102 so justieren, daß der Verzerrungsfaktor des linken Kanals minimal wird.
- Schritte 4 und 5 einige Male wiederholen.
- Überprüfen, daß die Verzerrungsfaktoren des linken und rechten Kanals fast gleich sind.

**Anmerkung:** Für die Justierung ist ein Schraubendreher aus Kunststoff zu verwenden.

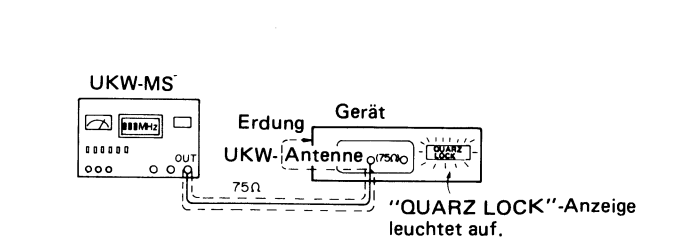
**ZUSTAND DES UKW-MESSENDERS**  
Modulation ..... 100%  
Modulationsfrequenz ... 400 Hz  
Ausgangspegel ..... 66 dB



#### JUSTIERUNG DES QUARZ-VERRIEGELUNG-AUFLEUCHTEPEGELS

- Der Testaufbau ist in der Abbildung gezeigt.
- Das Gerät auf "FM" einstellen.
- Die Radiofrequenzanzeige und den Meßsender auf 100.10 MHz einstellen.
- VR101 so justieren, daß die Quarz-Verriegelungs-Anzeige erlischt, wenn der Ausgang des UKW-Meßsenders auf 15 dB eingestellt wird, und aufleuchtet, wenn der Ausgang auf 16 dB eingestellt wird.
- Nach der Justierung ist die "UKW MONO-VERZERRUNGS-JUSTIERUNG durchzuführen.

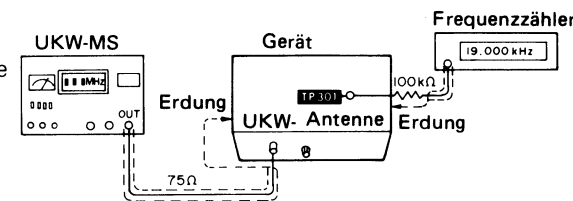
**ZUSTAND DES UKW-MESSENDERS**  
Modulation ..... 0%  
Modulationsfrequenz ..... 0%  
Ausgangspegel ..... 15 dB → 16 dB



### UKW-STEREO-JUSTIERUNG (FREIER LAUF)

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Den UKW-Betriebsart-Wahlschalter in die "FM auto"-Position stellen.
3. Die Radiofrequenz-Anzeige und den Meßsender auf 100,10 MHz einstellen.
4. **VR301** auf **19 kHz  $\pm$  50 Hz** auf der Frequenzzähleranzeige justieren.

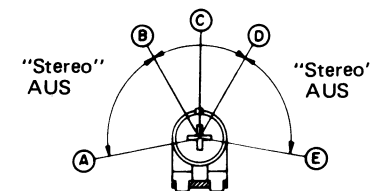
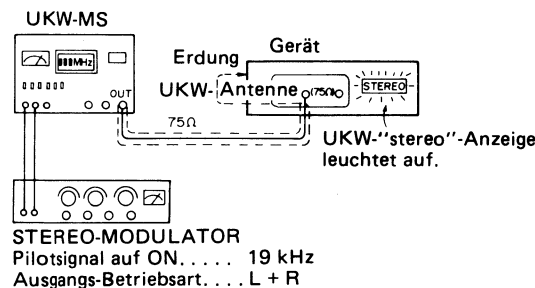
ZUSTAND DES UKW-MESSENDERS  
Modulation..... 0  
Modulationsfrequenz... 0  
Ausgangspegel..... 66 dB



### \* VERWENDUNG EINES ALTERNATIVSYSTEMS

1. Stereosignal vom Meßsender eingeben oder eine Stereo-Sendung empfangen.
2. **VR301** justieren, bis die Stereo-Anzeige aufleuchtet. Den Arm von **VR301** mit Lack sichern, wie in der Abbildung gezeigt.

ZUSTAND DES UKW-MESSENDERS  
Modulation..... 10%  
Modulationsfrequenz... Pilot (19 kHz)  
Ausgangspegel..... 66 dB

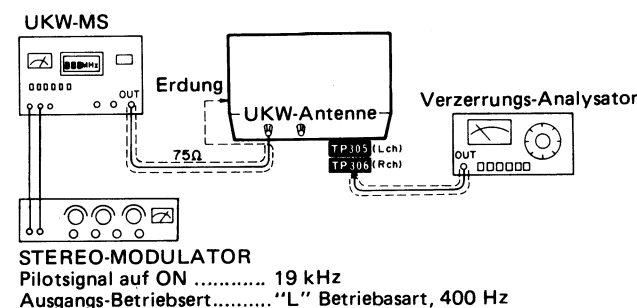


- VR301
- (A) - (B), (D) - (E) ..... "Stereo"-AUS-Position
  - (B) - (D) ..... "Stereo"-EIN-Position (Anzeige leuchtet)
  - (C) ..... Punkt der Pilotschaltung justieren

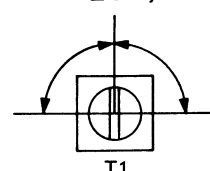
### UKW-ZFT-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Den UKW-Betriebsart-Wahlschalter in die "FM auto"-Position stellen.
3. Die Radiofrequenz-Anzeige und den Meßsender auf 100,10 MHz einstellen.
4. **T1** so justieren, daß der Verzerrungsfaktor des linken Kanals minimal wird.
5. Überprüfen, daß die Verzerrungsfaktoren des linken und rechten Kanals fast gleich sind und weniger als **1,5%** betragen.

ZUSTAND DES UKW-MESSENDERS  
Modulation ..... "L" Betriebsart 90%,  
Pilotsignal 10%  
Modulationsfrequenz ..... 400 Hz  
Ausgangspegel ..... 66 dB

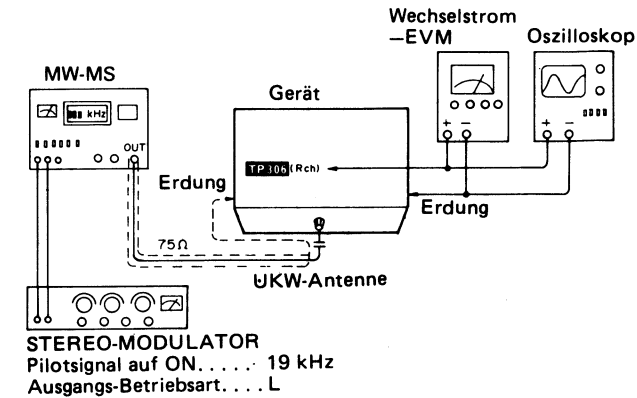


Innerhalb  $\pm 90^\circ$  justieren

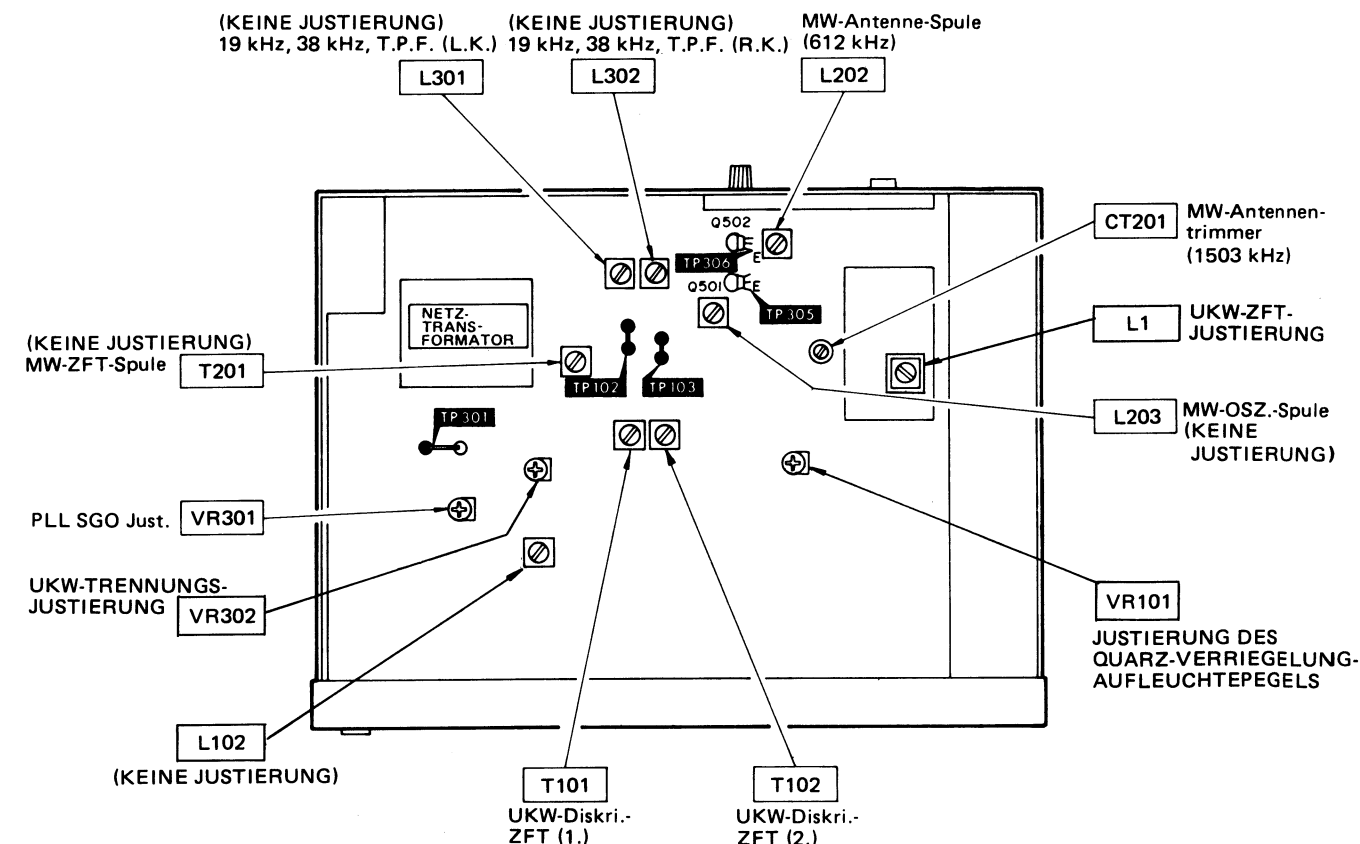


### UKW-TRENNUNGS-JUSTIERUNG

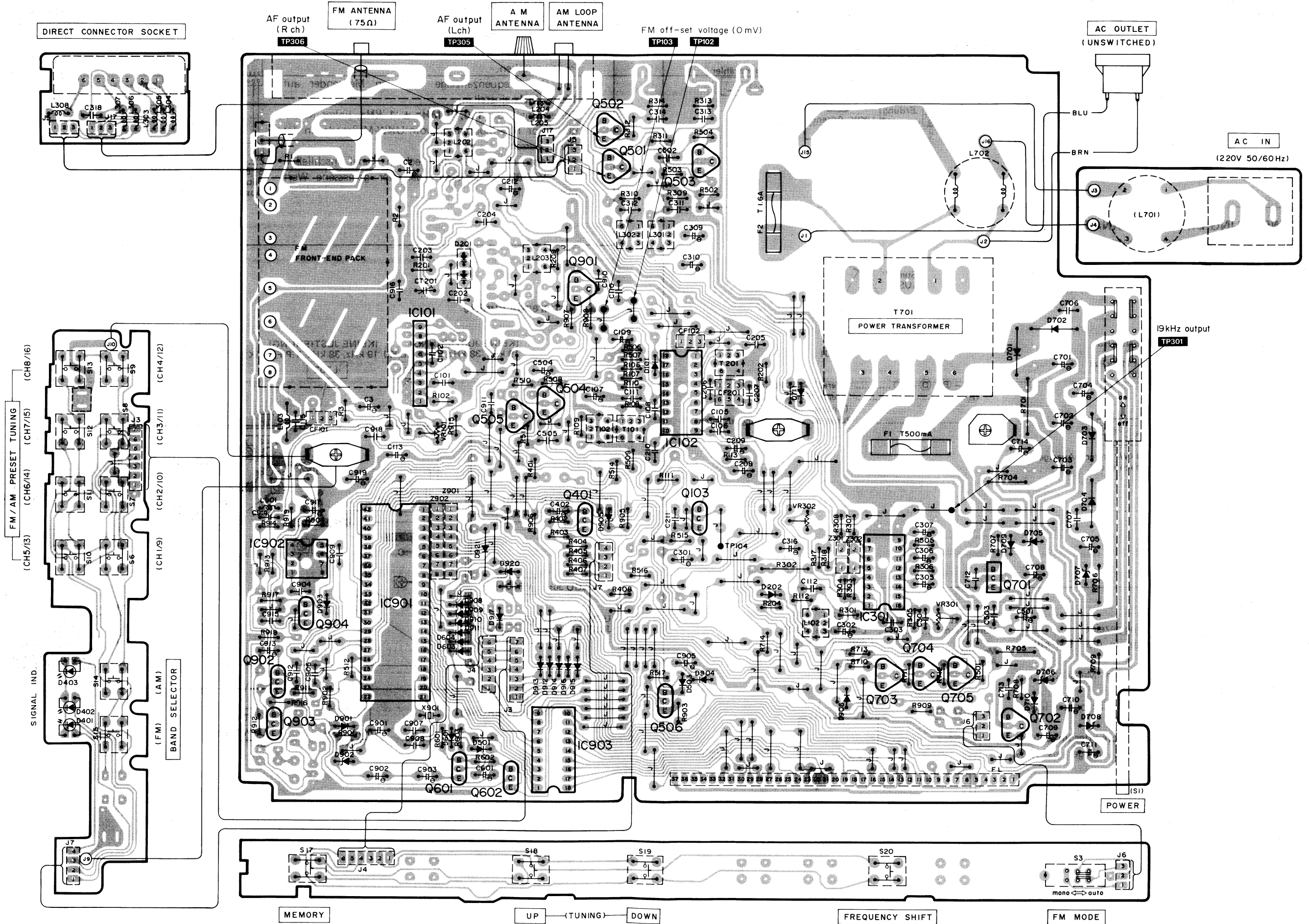
1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "FM" einstellen.
3. Den UKW-Betriebsart-Wahlschalter in die "FM auto"-Position stellen.
4. Die Radiofrequenzanzeige und den Meßsender auf **100,10 MHz** einstellen.
5. Stereosignal von **100,10 MHz  $\pm$  1 kHz**, linker Kanal, 90% Pilot 10% Modulation vom UKW-Meßsender in das Gerät speisen.
6. Wechselstrom-EVM an den rechten Kanal anschließen und **VR302** so justieren, daß der gemessene Wert minimal wird.



### • Zu justierende Punkte



## ■ CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM



# FUNCTION OF TERMINAL (PLL CONTROLLER IC901)

| Pin No. | Mark | Description of terminal                                                                                                                                                                                                                                                               | Pin No. | Mark | Description of terminal                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Sa   | Segment signal output terminal for display.<br>(Refer to Fig. 1)                                                                                                                                                                                                                      | 28      | PSC  | Reference signal for pre-scaler<br>This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (27) until the content of the inside swallow counter is 0. The frequency dividing ratio of pre-scaler is 1/17. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16. |
| 2       | Sb   |                                                                                                                                                                                                                                                                                       | 29      | INT  | This is the interrupt demand signal input terminal. The signal from the control input terminal is put into this terminal, demanding for interruption, then the flow of program will be unconditionally shifted to the address No. 1.                                                                                                                                                                                                                                               |
| 3       | Sc   |                                                                                                                                                                                                                                                                                       |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 4       | Sd   |                                                                                                                                                                                                                                                                                       | 30      | AM   | Input terminal for AM OSC output.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 5       | Se   |                                                                                                                                                                                                                                                                                       | 31      | Dp   | 2-bit input/output. Dp (31) is decimal point indication output terminal for digital indication. Lamp (32) is not used in this unit.                                                                                                                                                                                                                                                                                                                                                |
| 6       | Sf   |                                                                                                                                                                                                                                                                                       |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 7       | Sg   |                                                                                                                                                                                                                                                                                       | 32      | Lamp |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 8       | K0   | Input terminal for key return signal from external key matrix. The output of segment terminals (a ~ g) is used as the key return signal source.                                                                                                                                       | 33      | IF   | 4-bit output port. FM (35) is FM/AM output terminal; 5V in FM and 0V in AM. IF (33), LW (34) and AM (36) not used in this unit.                                                                                                                                                                                                                                                                                                                                                    |
| 9       | K1   |                                                                                                                                                                                                                                                                                       | 34      | LW   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 10      | K2   |                                                                                                                                                                                                                                                                                       | 35      | FM   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 11      | K3   |                                                                                                                                                                                                                                                                                       | 36      | AM   | This is a 4-bit input/output port. SDC (39) is the station detector control terminal, and is 5V during FM scanning and 0V during signal reception. The other terminals are not used in this unit.                                                                                                                                                                                                                                                                                  |
| 12      | D6   |                                                                                                                                                                                                                                                                                       | 37      | OFF  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 13      | D5   | Digit signal output terminal for display.<br>(Refer to Fig. 1)                                                                                                                                                                                                                        | 38      | MONO |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 14      | D4   |                                                                                                                                                                                                                                                                                       | 39      | SDC  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 15      | D3   |                                                                                                                                                                                                                                                                                       | 40      | D    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 16      | D2   |                                                                                                                                                                                                                                                                                       | 41      | COMP | Not used in this unit.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 17      | D1   |                                                                                                                                                                                                                                                                                       | 42      | VDP  | Not used in this unit.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 18      | MT   | This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level.                                                                                                                   |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 19      | X2   | Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.                                                                                                                                                                                                      |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 20      | X1   |                                                                                                                                                                                                                                                                                       |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 21      | VDD  |                                                                                                                                                                                                                                                                                       |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 22      | E01  |                                                                                                                                                                                                                                                                                       |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 23      | GND  |                                                                                                                                                                                                                                                                                       |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 24      | E02  | When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.                                                       |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 25      | CE   | This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low.<br>When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held. |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 26      | SD   | This input terminal detects the reception of a broadcasting station. The voltage is 5.3V during reception, and otherwise 0V.                                                                                                                                                          |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 27      | FM   | Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler.                                                                                                                                                                                                     |         |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

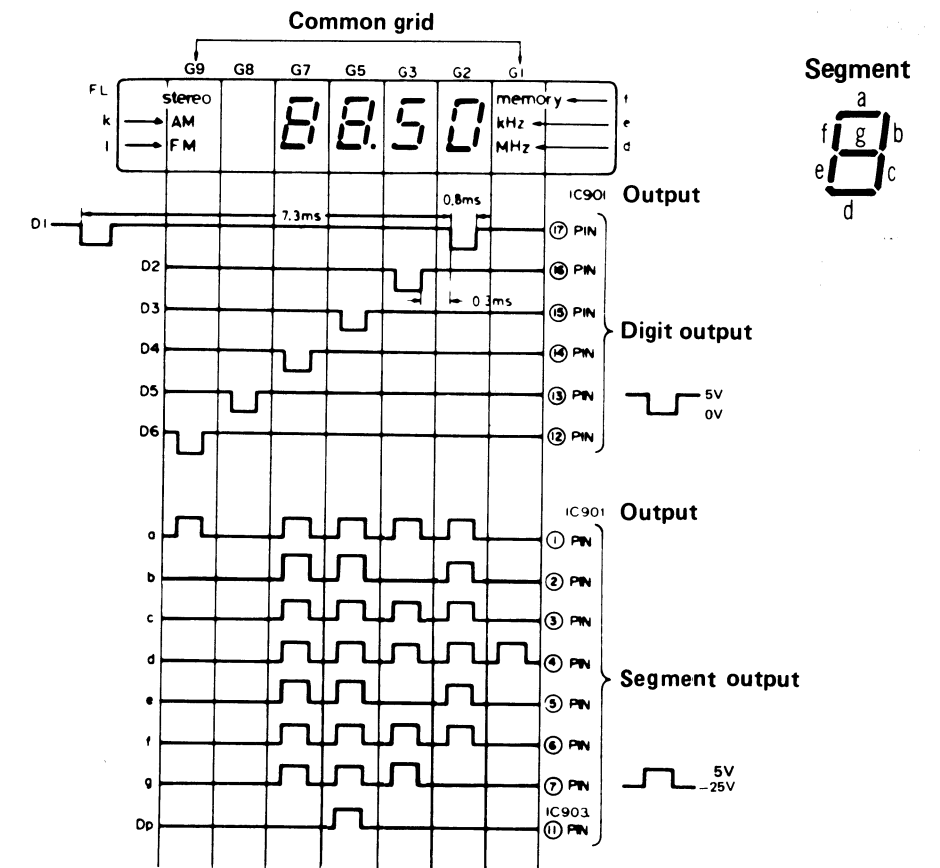
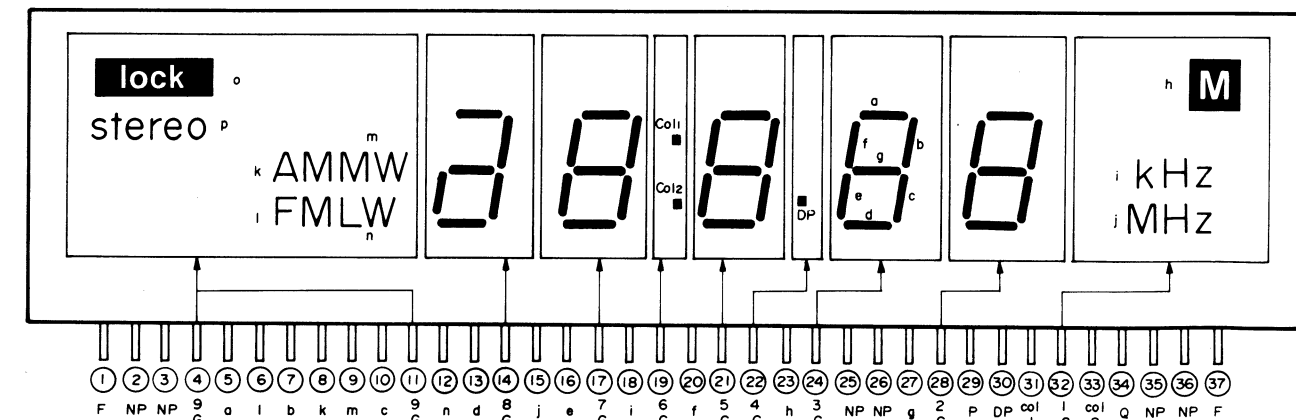


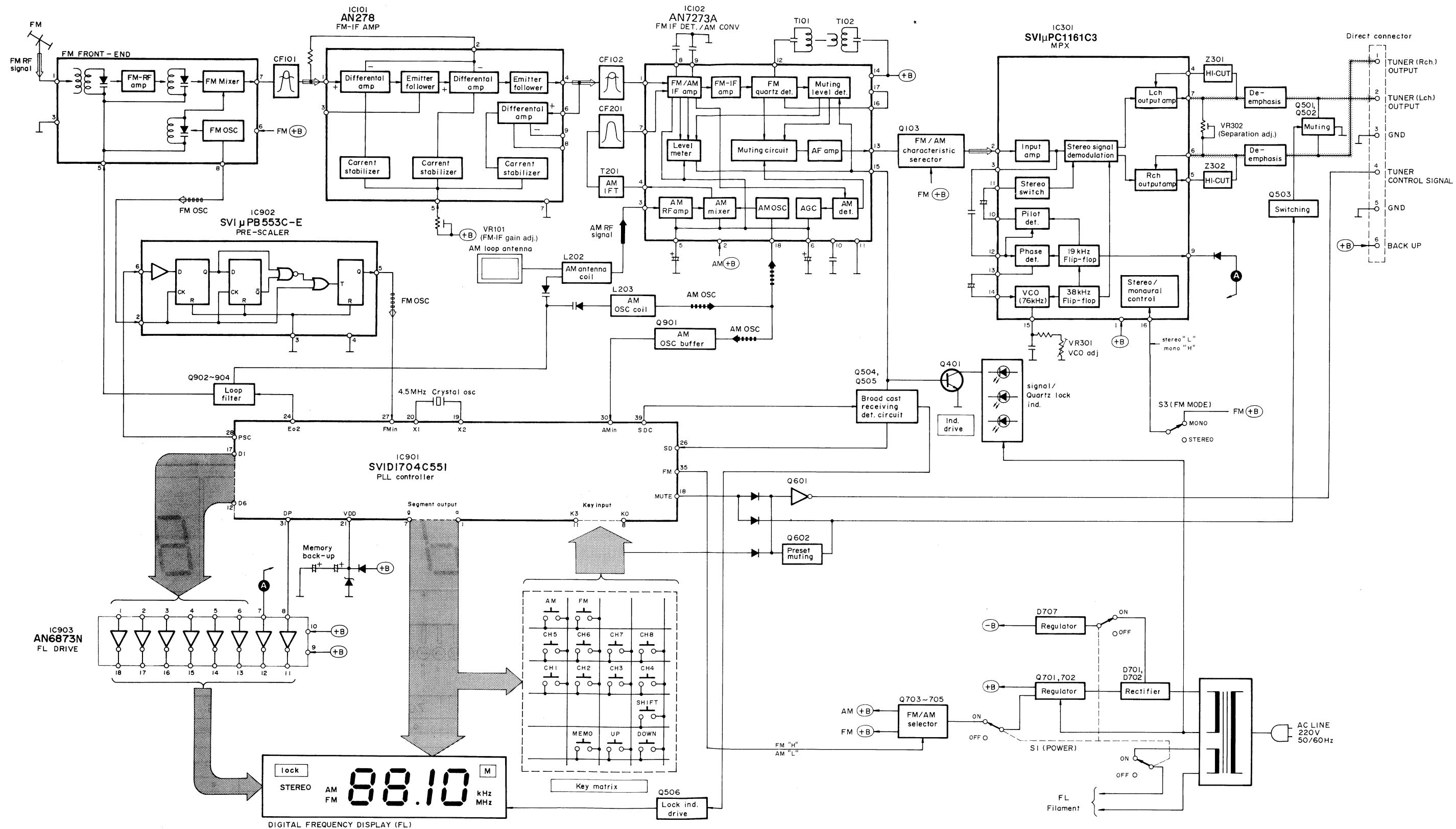
Fig. 1

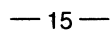
## Digital frequency display tube (FL)



| Grid            | 9G                                                               | 8G | 7G | 6G                 | 5G | 4G | 3G | 2G | 1G                          |
|-----------------|------------------------------------------------------------------|----|----|--------------------|----|----|----|----|-----------------------------|
| Segment         | a                                                                | a  | a  | a                  | a  | a  | a  | a  | a                           |
| b               | b                                                                | b  | b  | b                  | b  | b  | b  | b  | b                           |
| c               | c                                                                | c  | c  | c                  | c  | c  | c  | c  | c                           |
| d               | d                                                                | d  | d  | d                  | d  | d  | d  | d  | d                           |
| e               | e                                                                | e  | e  | e                  | e  | e  | e  | e  | e                           |
| f               | f                                                                | f  | f  | f                  | f  | f  | f  | f  | f                           |
| g               | g                                                                | g  | g  | g                  | g  | g  | g  | g  | g                           |
| Independent Pin | AM (k)<br>FM (l)<br>MW (m)<br>LW (n)<br>[lock] (o)<br>stereo (p) |    |    | col (1)<br>col (2) |    | DP |    |    | M (h)<br>kHz (i)<br>MHz (j) |

■ BLOCK DIAGRAM





## ■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

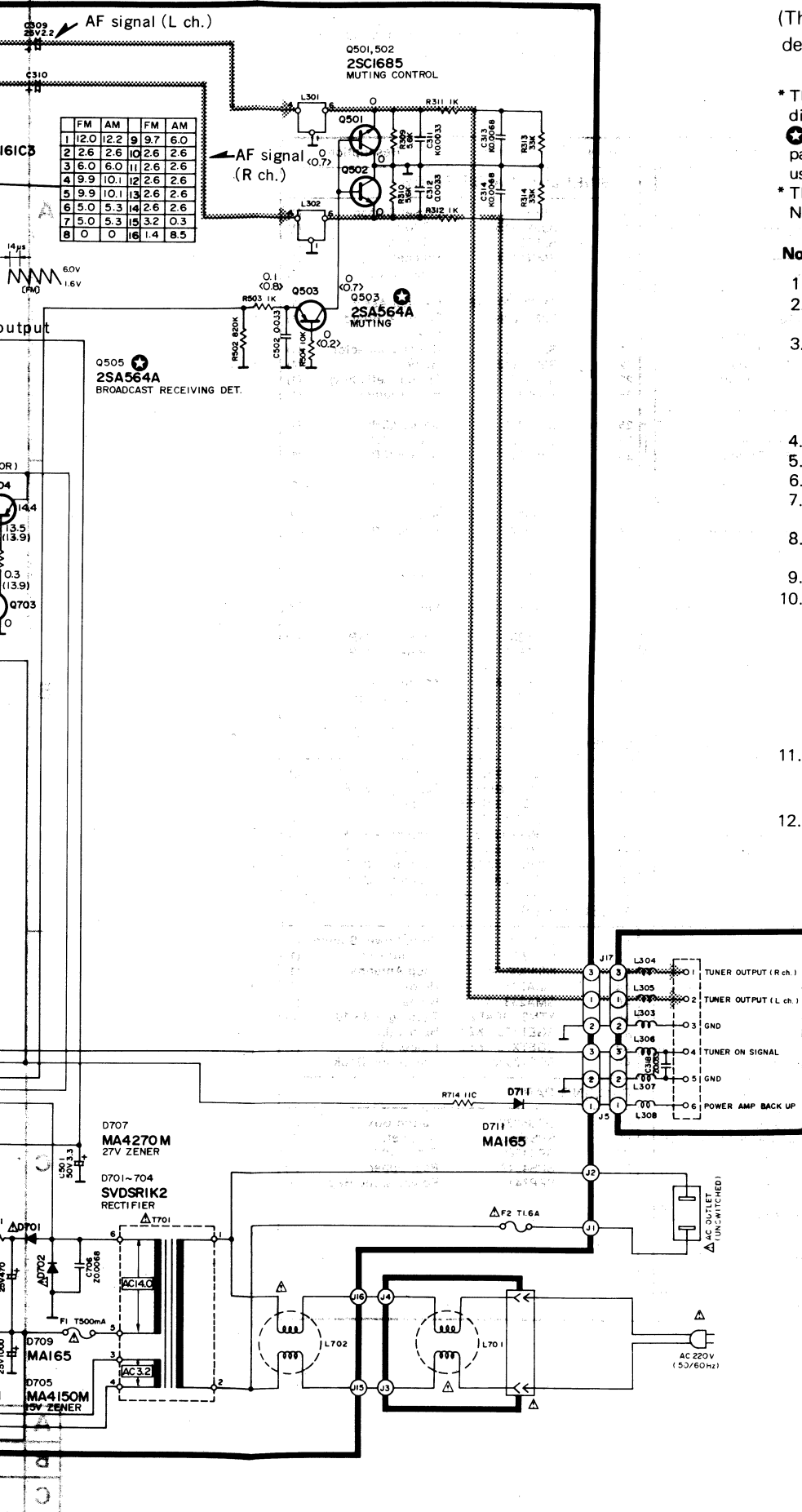
\* The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with **⊕** mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement part list.

\* This is the basic circuit diagram of this unit.

Note that part of the circuit is subject to change depending on the areas.

### Note:

1. **S1** : Power source switch in "on" position.
2. **S3** : FM mode selector switch in "auto" position.  
auto ↔ mono
3. **S6 ~ S13** : Preset tuning switch.  
\* With it momentarily pushed (less than 0.4 sec) and released, the 1 ~ 8 CH are received.  
\* With it continuously pushed (0.4 sec. or more) and released, the 9 ~ 16 CH are received.
4. **S14** : AM selector switch.
5. **S15** : FM selector switch.
6. **S17** : Memory switch. (manual ↔ auto memory)
7. **S18** : Tuning (up) switch.  
[up : tuning to higher frequency]
8. **S19** : Tuning (down) switch.  
[down : tuning to lower frequency]
9. **S20** : FM frequency shift switch. (off ↔ +25 kHz)
10. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.  
\* All voltage values shown in circuitry are DC voltage in FM signal (no signal) reception mode.  
\* Figures in □ stand for DC voltage in FM stereo signal reception mode.  
\* Figures in < > stand for DC voltage in muting mode.
11. — Positive voltage lines and Negative voltage lines.  
—— AF signal lines      — FM signal      □ FM OSC  
—— AM signal      — AM OSC
12. Important safety notice.  
Components identified by **⊕** mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

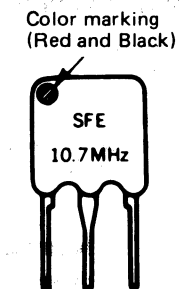


### Note 2:

#### ● Use of ceramic filters in pairs

The ceramic filters (CF101, CF102) for FM-IF circuit are available in two ranks.

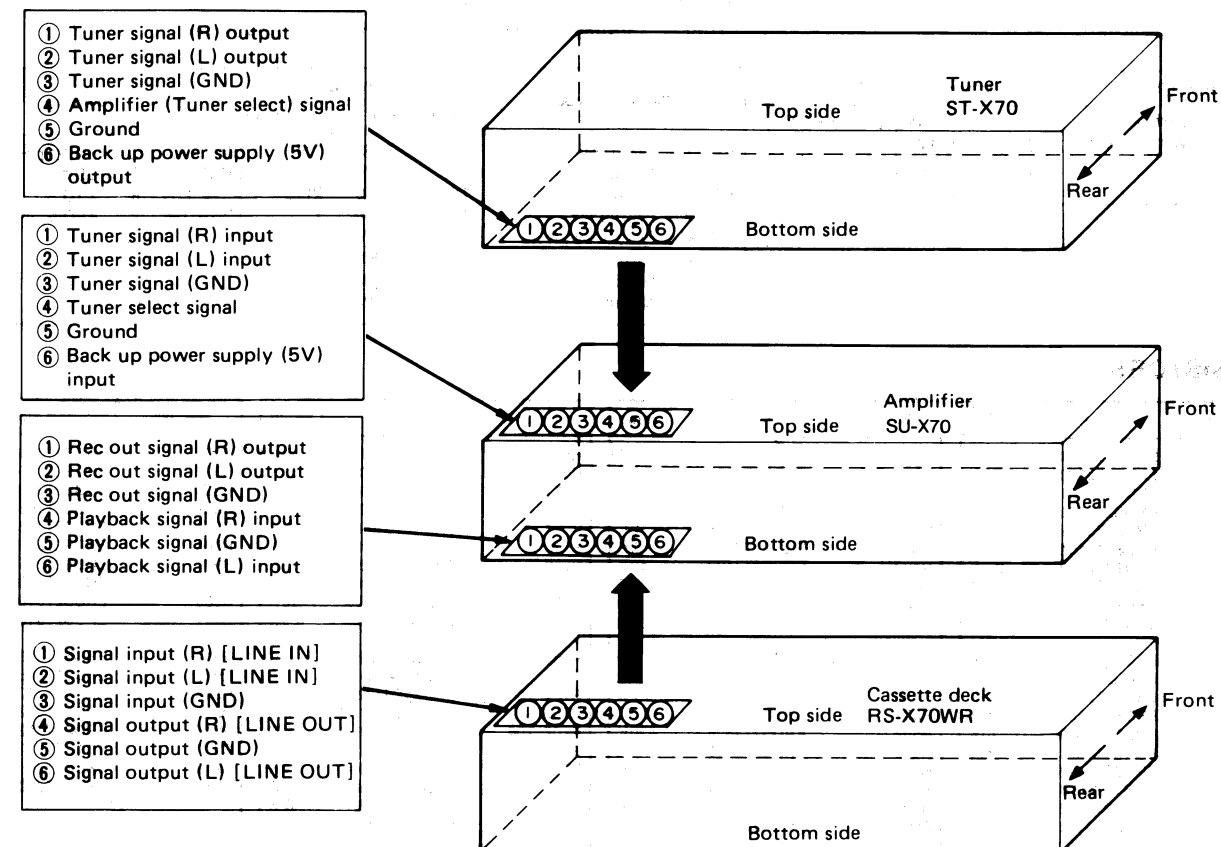
For this circuit, be sure to use the ceramics of the same rank in a pair. At repairing and replacement, pay close attention to the diode (D921) for use as different diodes must be used depending on each rank of the ceramic filters.



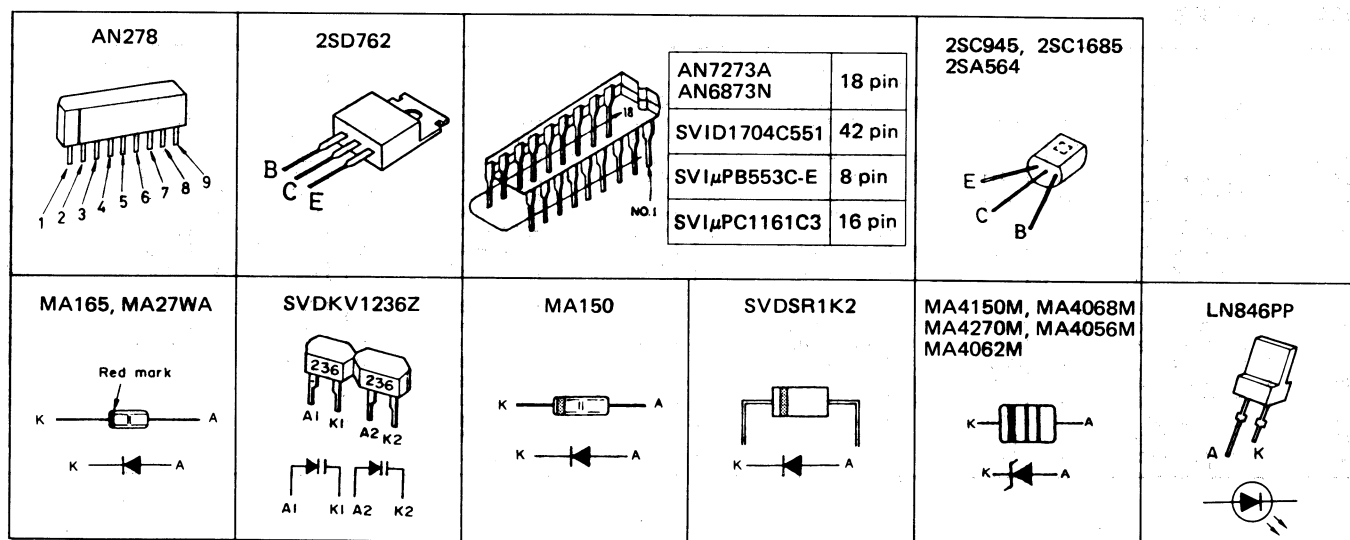
| RANK (Color) | D921 | CENTER FREQUENCY |
|--------------|------|------------------|
| Black        | ○    | 10.65 MHz        |
| Red          | X    | 10.70 MHz        |

Note: ○ Mark Diode is used.  
X Mark Diode is not used.

## ■ TERMINAL FUNCTION OF DIRECT CONNECTOR



## ■ TERMINAL GUIDE OF TRANSISTORS, IC'S AND DIODES



## ■ RESISTORS AND CAPACITORS

**Notes:** 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts order.  
2. Important safety notice:  
Components identified by  $\Delta$  mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

## Numbering System of Resistor

|         |         |       |           |       |     |
|---------|---------|-------|-----------|-------|-----|
| Example | ERD     | 25    | F         | J     | 101 |
| Type    | Wattage | Shape | Tolerance | Value |     |

| Resistor Type     | Wattage                          | Tolerance     |
|-------------------|----------------------------------|---------------|
| ERD : Carbon      | 25 : 1/4W                        | J : $\pm 5\%$ |
| ERG : Metal Oxide | S2 : 1/4W<br>S1 : 1/2W<br>1 : 1W |               |

## ● RESISTORS

| Ref. No.  | Part No.   | Value | Ref. No.  | Part No.   | Value | Ref. No.  | Part No.   | Value | Ref. No. | Part No.   | Value |
|-----------|------------|-------|-----------|------------|-------|-----------|------------|-------|----------|------------|-------|
| R1        | ERDS2TJ104 | 100K  | R307, 308 | ERDS2TJ222 | 2.2K  | R509      | ERDS2TJ561 | 560   | R901     | ERDS2TJ561 | 560   |
| R2        | ERDS2TJ223 | 22K   | R309, 310 | ERDS2TJ562 | 5.6K  | R510      | ERDS2TJ333 | 33K   | R902     | ERDS2TJ103 | 10K   |
| R3        | ERDS2TJ101 | 100   | R311, 312 | ERDS2TJ102 | 1K    | R511      | ERDS2TJ331 | 330   | R903     | ERDS2TJ100 | 10    |
| R102      | ERDS2TJ331 | 330   | R313, 314 | ERDS2TJ333 | 33K   | R512      | ERDS2TJ472 | 4.7K  | R904     | ERDS2TJ684 | 680K  |
| R106      | ERDS2TJ471 | 470   | R317, 318 | ERDS2TJ123 | 12K   | R514      | ERDS2TJ103 | 10K   | R905     | ERDS2TJ682 | 6.8K  |
| R107      | ERDS2TJ102 | 1K    | R401      | ERDS2TJ152 | 1.5K  | R515      | ERDS2TJ104 | 100K  | R906     | ERDS2TJ562 | 5.6K  |
| R108      | ERDS2TJ822 | 8.2K  | R402      | ERDS2TJ103 | 10K   | R516      | ERDS2TJ333 | 33K   | R907     | ERDS2TJ684 | 680K  |
| R109      | ERDS2TJ222 | 2.2K  | R403      | ERDS2TJ821 | 820   | R517      | ERDS2TJ104 | 100K  | R908     | ERDS2TJ103 | 10K   |
| R110      | ERDS2TJ471 | 470   | R404      | ERDS2TJ331 | 330   | R601      | ERDS2TJ103 | 10K   | R909     | ERDS2TJ104 | 100K  |
| R111      | ERDS2TJ104 | 100K  | R405      | ERDS2TJ151 | 150   | R602      | ERDS2TJ104 | 100K  | R911     | ERDS2TJ102 | 1K    |
| R112      | ERDS2TJ223 | 22K   | R406      | ERDS2TJ121 | 120   | R603      | ERDS2TJ152 | 1.5K  | R912     | ERDS2TJ561 | 560   |
| R113      | ERDS2TJ103 | 10K   | R407      | ERDS2TJ100 | 10    | R701      | ERG1ANJ680 | 68    | R913     | ERDS2TJ682 | 6.8K  |
| R201      | ERDS2TJ104 | 100K  | R408      | ERDS2TJ122 | 1.2K  | R704, 705 | ERDS1FJ102 | 1K    | R914     | ERDS2TJ102 | 1K    |
| R202      | ERDS2TJ152 | 1.5K  | R501      | ERDS2TJ222 | 2.2K  | R706      | ERDS1FJ121 | 120   | R915     | ERDS2TJ822 | 8.2K  |
| R204      | ERDS2TJ103 | 10K   | R502      | ERDS2TJ824 | 820K  | R707, 708 | ERDS2TJ101 | 100   | R916     | ERDS2TJ223 | 22K   |
| R209      | ERDS2TJ821 | 820   | R503      | ERDS2TJ102 | 1K    | R709      | ERDS2TJ101 | 100   | R917     | ERDS2TJ123 | 12K   |
| R301      | ERDS2TJ123 | 12K   | R504      | ERDS2TJ103 | 10K   | R710      | ERDS2TJ473 | 47K   | R918     | ERDS2TJ682 | 6.8K  |
| R302      | ERG1ANJ470 | 47    | R505      | ERDS2TJ154 | 150K  | R711      | ERDS2TJ103 | 10K   | R919     | ERDS2TJ101 | 100   |
| R303, 304 | ERDS2TJ223 | 22K   | R506      | ERDS2TJ332 | 3.3K  | R712      | ERDS2TJ473 | 47K   |          |            |       |
| R305      | ERDS2TJ153 | 15K   | R507      | ERDS2TJ103 | 10K   | R713      | ERDS2TJ154 | 150K  |          |            |       |
| R306      | ERDS2TJ102 | 1K    | R508      | ERDS2TJ104 | 100K  | R714      | ERDS2TJ100 | 10    |          |            |       |

## ● CAPACITORS

| Ref. No.  | Part No.     | Value | Ref. No.  | Part No.     | Value  | Ref. No.  | Part No.     | Value  | Ref. No.  | Part No.     | Value |
|-----------|--------------|-------|-----------|--------------|--------|-----------|--------------|--------|-----------|--------------|-------|
| C2        | ECEA1HU3R3   | 3.3   | C207      | ECDD1H470K   | 47P    | C501      | ECEA1HU3R3   | 3.3    | C904      | ECCKD1H103ZF | 0.01  |
| C3        | ECEA1CU101   | 100   | C208      | ECEA0JU101   | 100    | C502      | ECCKD1H333ZF | 0.033  | C905      | ECEA0JU101   | 100   |
| C4        | ECDD1H470K   | 48P   | C209      | ECEA1HU3R3   | 3.3    | C503      | ECCKD1H103ZF | 0.01   | C906      | ECCKD1H103ZF | 0.01  |
| C101, 102 | ECCKD1H103ZF | 0.01  | C210      | ECCKD1H223ZF | 0.022  | C504      | ECEA1HUR47   | 0.47   | C907      | ECCKD1H080CC | 8P    |
| C105      | ECCKD1H103ZF | 0.01  | C211      | ECQM1H183JZ  | 0.018  | C505      | ECCKD1H103ZF | 0.01   | C908      | ECCKD1H180KC | 18P   |
| C106      | ECCKD1H223ZF | 0.022 | C212      | ECEA1CU101   | 100    | C601      | ECEA1HUR47   | 0.47   | C909      | ECCKD1H103ZF | 0.01  |
| C107      | ECEA1CU100   | 10    | C301      | ECEA1VU4R7   | 4.7    | C701      | ECEA1EU471   | 470    | C910      | ECCKD1H180K  | 18P   |
| C108      | ECCKD1H103ZF | 0.01  | C302      | ECEA1CU101   | 100    | C702      | ECEA1EU102   | 1000   | C911, 912 | ECCKD1H103ZF | 0.01  |
| C109      | ECEA1HU010   | 1     | C303      | ECQM1H473JZ  | 0.047  | C703      | ECEA1HU221   | 220    | C913      | ECEA25M4R7R  | 4.7   |
| C110      | ECCKD1H223ZF | 0.022 | C304      | ECQP1471JZ   | 470P   | C704, 705 | ECEA1HU470   | 47     | C914      | ECCKD1H223ZF | 0.022 |
| C111      | ECCKD1H101K  | 100P  | C305      | ECEA1HU010   | 1      | C706, 707 | ECCKD2H682PE | 0.0068 | C915, 916 | ECCKD1H103ZF | 0.01  |
| C112      | ECCKD1H221K  | 220P  | C306      | ECEA1HU3R3   | 3.3    | C708      | ECEA1CU471   | 470    | C917      | ECEA1CU100   | 10    |
| C113      | ECEA1HU2R2   | 2.2   | C307      | ECEA1HU010   | 1      | C709      | ECEA1CU101   | 100    | C918      | ECCKD1H223ZF | 0.022 |
| C115      | ECCKD1H471J  | 470P  | C309, 310 | ECEA1HU2R2   | 2.2    | C710      | ECEA1VU330   | 33     | C919      | ECEA1HU010   | 1     |
| C202      | ECQM1H473JZ  | 0.047 | C311, 312 | ECQM1H332JZ  | 0.0033 | C711      | ECEA1HU3R3   | 3.3    |           |              |       |
| C203      | ECCKD1H180KC | 18P   | C313, 314 | ECQM1H392JZ  | 0.0039 | C712, 713 | ECCKD1H103ZF | 0.01   |           |              |       |
| C204      | ECQP1471JZ   | 470P  | C316      | ECEA1CU330   | 33     | C714      | ECEA1HU010   | 1      |           |              |       |
| C205      | ECCKD1H223ZF | 0.022 | C318      | ECCKD1H333ZF | 0.033  | C901      | ECEA0JU102   | 1000   |           |              |       |
| C206      | ECCKD1H080CC | 8P    | C402      | ECEA1HU3R3   | 3.3    | C902, 903 | EECW2R3A3R3E | 3.3    |           |              |       |

## ■ REPLACEMENT PARTS LIST

**Notes:** 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts order.  
2. Important safety notice:  
Components identified by  $\Delta$  mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

| Ref. No.            | Part No.           | Description        |
|---------------------|--------------------|--------------------|
| INTEGRATED CIRCUITS |                    |                    |
| IC101               | AN278              | Integrated Circuit |
| IC102               | AN7273A            | Integrated Circuit |
| IC301               | SVI $\mu$ PC1161C3 | Integrated Circuit |
| IC901               | SVID1704C551       | Integrated Circuit |
| IC902               | UPB553AC           | Integrated Circuit |
| IC903               | AN6873N            | Integrated Circuit |

|                                                   |             |                                     |
|---------------------------------------------------|-------------|-------------------------------------|
| TRANSISTORS                                       |             |                                     |
| Q103, 401, 501, 502, 504, 601, 602, 702, 703, 901 | 2SC1685—QNC | Transistor                          |
| Q503, 505, 506, 704, 705                          | 2SA722—S    | Transistor (Product part is 2SA564) |
| Q701                                              | 2SD762—Q    | Transistor                          |
| Q902—904                                          | 2SC1815Y    | Transistor (Product part is 2SC945) |

|                                                                          |                     |           |
|--------------------------------------------------------------------------|---------------------|-----------|
| DIODES                                                                   |                     |           |
| D101                                                                     | MA27W—A             | Diode     |
| D201                                                                     | $\Delta$ SVDKV1236Z | Rectifier |
| D202, 501, 503, 601, 603, 604, 709—711, 901, 903, 904, 906, 911—917, 920 | MA165               | Diode     |
| D401—403                                                                 | LN846RP             | LED       |
| D701—704                                                                 | $\Delta$ SVDSR1K2   | Rectifier |
| D705                                                                     | MA4150M             | Diode     |
| D706                                                                     | MA4068M             | Diode     |
| D707                                                                     | MA4270M             | Diode     |
| D708, 905                                                                | MA4062M             | Diode     |
| D902                                                                     | MA4056M             | Diode     |
| D921                                                                     | $\Delta$ MA162A     | Diode     |

|                |             |      |
|----------------|-------------|------|
| COILS          |             |      |
| L102           | SLM1B1—P    | Coil |
| L103, 204, 205 | ELEPH1R0MA  | Coil |
| L202           | SLA2B1—1M   | Coil |
| L203           | SL02B7—M    | Coil |
| L301, 302      | SLM1B3—K    | Coil |
| L303           | ELEPG4R7MA  | Coil |
| L304, 305      | ELEPG1R2MA  | Coil |
| L306, 308, 901 | ELEPG1R0MA  | Coil |
| L307           | ELEPH3R9MA  | Coil |
| L701, 702      | SLQZ650MH49 | Coil |

|              |                   |              |
|--------------|-------------------|--------------|
| TRANSFORMERS |                   |              |
| T101         | SL14B511—Z        | Transformer  |
| T102         | SL14B513—Z        | Transformer  |
| T201         | SL12B101—M        | Transformer  |
| T701         | $\Delta$ SLT5K141 | Power Source |

|                 |              |                       |
|-----------------|--------------|-----------------------|
| CERAMIC FILTERS |              |                       |
| CF101, 102      | SVFE107MS8—A | FM, 10.7 MHz (Red)    |
|                 | SVFE107MS8—D | FM, 10.65 MHz (Black) |
| CF201           | SVFSFZ450F7L | AM, 450 kHz           |

| Ref. No.           | Part No.     | Description                          |
|--------------------|--------------|--------------------------------------|
| CRYSTAL            |              |                                      |
| X901               | SVQ43U452—D  | Crystal OSC                          |
| VARIABLE RESISTORS |              |                                      |
| VR101              | QVNB3A00B472 | Variable Resistor, 4.7k $\Omega$ (B) |
| VR301              | QVNB3A00B472 | Variable Resistor, 4.7k $\Omega$ (B) |
| VR302              | QVNB3A00B474 | Variable Resistor, 470k $\Omega$ (B) |

|                    |              |                |
|--------------------|--------------|----------------|
| VARIABLE CAPACITOR |              |                |
| CT201              | SVCTZ03T110F | Trimmer        |
| FRONT END          |              |                |
|                    | SNVFE407G24  | Front End Pack |

|                          |           |                   |
|--------------------------|-----------|-------------------|
| FLUORESCENT DISPLAY TUBE |           |                   |
| FL                       | SAD9MT27Z | Frequency Display |

|                        |              |                              |
|------------------------|--------------|------------------------------|
| COMPONENT COMBINATIONS |              |                              |
| Z301, 302              | EXRP102K473T | 0.001 $\mu$ F, 47k $\Omega$  |
| Z901                   | EXBP87104K   | 100k $\Omega$ ( $\times 7$ ) |
| Z902                   | EXFP7331MW   | 330pF ( $\times 1$ )         |

|       |                     |               |
|-------|---------------------|---------------|
| FUSES |                     |               |
| F1    | $\Delta$ XBA2C05TR0 | 250V, T 500mA |
| F2    | XBA2C16TR0          | 250V, T 1.6A  |

|              |                  |              |
|--------------|------------------|--------------|
| SWITCHES     |                  |              |
| S1           | $\Delta$ SSH1069 | Power Source |
| S3           | SSS160           | Auto-Mono    |
| S6—15, 17—20 | SSG13            | Preset       |

|       |                 |       |
|-------|-----------------|-------|
| COILS |                 |       |
| D921  | $\Delta$ MA162A | Diode |

| Ref. No.                  | Part No.    | Description            |
|---------------------------|-------------|------------------------|
| CABINET and CHASSIS PARTS |             |                        |
| 1                         | SUV536      | Button Cover (1)       |
| 2                         | SBC681—1    | Preset Button (1)      |
| 3                         | SBC680—1    | Preset Button (1)      |
| 4                         | SBD110—1    | Preset Button (1)      |
| 5                         | SHR9747     | FL Holder (1)          |
| 6                         | SGYTX70—KE1 | Front Panel Ass'y (1)  |
| 6-1                       | SQU454      | Transparent Plate (1)  |
| 6-2                       | SDU261—1    | Filter (1)             |
| 7                         | SGYTX70—KE2 | Ornament Cover (1)     |
| 9                         | SBC489      | Ass'y Power Button (1) |

|      |            |                    |
|------|------------|--------------------|
| 10   | SBC688—2   | AM/FM Button (1)   |
| 11   | SBC673—1   | Preset Button (1)  |
| 12   | SUB111—2   | Connection Rod (1) |
| 13   | SGPTX70—SG | Chassis Ass'y (1)  |
| 13-1 | SKL293     | Foot (4)           |

| Ref. No.                  | Part No.   | Description              |
|---------------------------|------------|--------------------------|
| CABINET and CHASSIS PARTS |            |                          |
| 14                        | SBC681—2   | Preset Button (1)        |
| 15                        | SJS9231B   | AC Inlet (1)             |
| 16                        | SJS9225    | AC Outlet (1)            |
| 17                        | SMN1959    | Bracket (1)              |
| 18                        | SJT347     | Fuse Holder (4)          |
| 19                        | SKCTX70—KE | Cabinet Ass'y (1)        |
| 20                        | SJF8303N   | Terminal Board (ANT) (1) |
| 21                        | SJS9605    | Direct Connector (1)     |
| 22                        | SMN1942    | Holder (1)               |
| 23                        | SUS775     | Spring (Left Only) (1)   |
| 24                        | SHR301     | Read Clamper (1)         |

|    |          |                    |
|----|----------|--------------------|
| 25 | SJS5327  | Socket (3P) (1)    |
| 25 | SJS5421  | Socket (4P) (1)    |
| 25 | SJS5707  | Socket (7P) (1)    |
| 26 | SJT783   | Pin (12)           |
| 27 | SJS5331  | Socket (3P) (2)    |
| 27 | SJS5629  | Socket (6P) (1)    |
| 28 | SJT3319  | Post (3P) (2)      |
| 28 | SJT3611  | Post (6P) (1)      |
| 29 | SJT785   | Pin (12)           |
| 30 | SJS5337  | Connector (3P) (2) |
| 30 | SJS5633  | Connector (6P) (1) |
| 31 | SJS9231A | AC Inlet Cover (1) |
| 32 | SUS772   | Shield Bracket (1) |
| 33 | SJE87    | Cord (1)           |

|        |             |                                |
|--------|-------------|--------------------------------|
| SCREWS |             |                                |
| N1     | XTB3+10BFYR | Tapping $\phi 3 \times 10$ (2) |
| N2     | XTW3+8BFZ   | Tapping $\phi 3 \times 8$ (5)  |
| N3     | XTB3+10BFYR | Tapping $\phi 3 \times 10$ (4) |
| N5     | SNE2095—5   | Cabinet (4)                    |
| N6     | XTW3+8BFZ   | Tapping $\phi 3 \times 8$ (3)  |
| N7     | XTB3+8BFZ1  | Tapping $\phi 3 \times 8$ (4)  |
| N8     | XTB3+8BFZ1  | Tapping $\phi 3 \times 8$ (2)  |
| N9     | XTB3+8BFZ   | Tapping $\phi 3 \times 6$ (2)  |

|             |                 |                                |
|-------------|-----------------|--------------------------------|
| ACCESSORIES |                 |                                |
| A1          | $\Delta$ SJA171 | Cord, Power Source (1)         |
| A2          | SSA270          | FM Antenna (1)                 |
| A3          | SSA902—4        | Loop Antenna (1)               |
| A4          | SMA231          | Holder (1)                     |
| A5          | SMA233—1        | Holder (1)                     |
| A6          | XTN3+10AFZ      | Tapping $\phi 3 \times 10$ (2) |
| A7          | SGETX70—KE1     | Holder (L) (1)                 |
| A8          | SGETX70—KE2     | Holder (R) (1)                 |
| A9          | SQF12322        | Instruction Book (1)           |

|               |         |                      |
|---------------|---------|----------------------|
| PACKING PARTS |         |                      |
| P1            | SPG5232 | Carton Box (1)       |
| P2            | SPS4565 | Pad, Left (1)        |
| P3            | SPS4566 | Pad, Right (1)       |
| P4            | SPS4549 | Pad, Upper (1)       |
| P5            | SPP741  | Polyethylene Bag (1) |

## ■ EXPLODED

A

B

C

A

B

C

EXPLODED VIEW

and may differ  
n of description

| Description      |     |
|------------------|-----|
| RTS              |     |
| Reset Button     | (1) |
| C Inlet          | (1) |
| C Outlet         | (1) |
| Socket           | (1) |
| Base Holder      | (4) |
| Cabinet Ass'y    |     |
| Terminal Board   | (1) |
| NT               | (1) |
| Direct Connector | (1) |
| Holder           | (1) |
| Ring (Left Only) | (1) |
| Lead Clamper     | (1) |
| Socket (3P)      | (1) |
| Socket (4P)      | (1) |
| Socket (7P)      | (1) |
| n                |     |
| Socket (3P)      | (2) |
| Socket (6P)      | (1) |
| st (3P)          | (2) |
| st (6P)          | (1) |
| n                |     |
| Connector (3P)   | (2) |
| Connector (6P)   | (1) |
| C Inlet Cover    | (1) |
| Field Bracket    | (1) |
| rd               | (1) |
| ppping           |     |
| ppping           | (2) |
| ppping           | (5) |
| ppping           | (4) |
| binet            | (4) |
| ppping           | (3) |
| ppping           | (4) |
| ppping           | (2) |
| ppping           | (2) |
| rd, Power Source |     |
| Antenna          | (1) |
| op Antenna       | (1) |
| lder             | (1) |
| lder             | (1) |
| ppping           | (2) |
| lder (L)         | (1) |
| lder (R)         | (1) |
| truction Book    | (1) |
| rtion Box        |     |
| d, Left          | (1) |
| d, Right         | (1) |
| d, Upper         | (1) |
| lyethylene Bag   | (1) |

